FIG.1

PRIOR ART

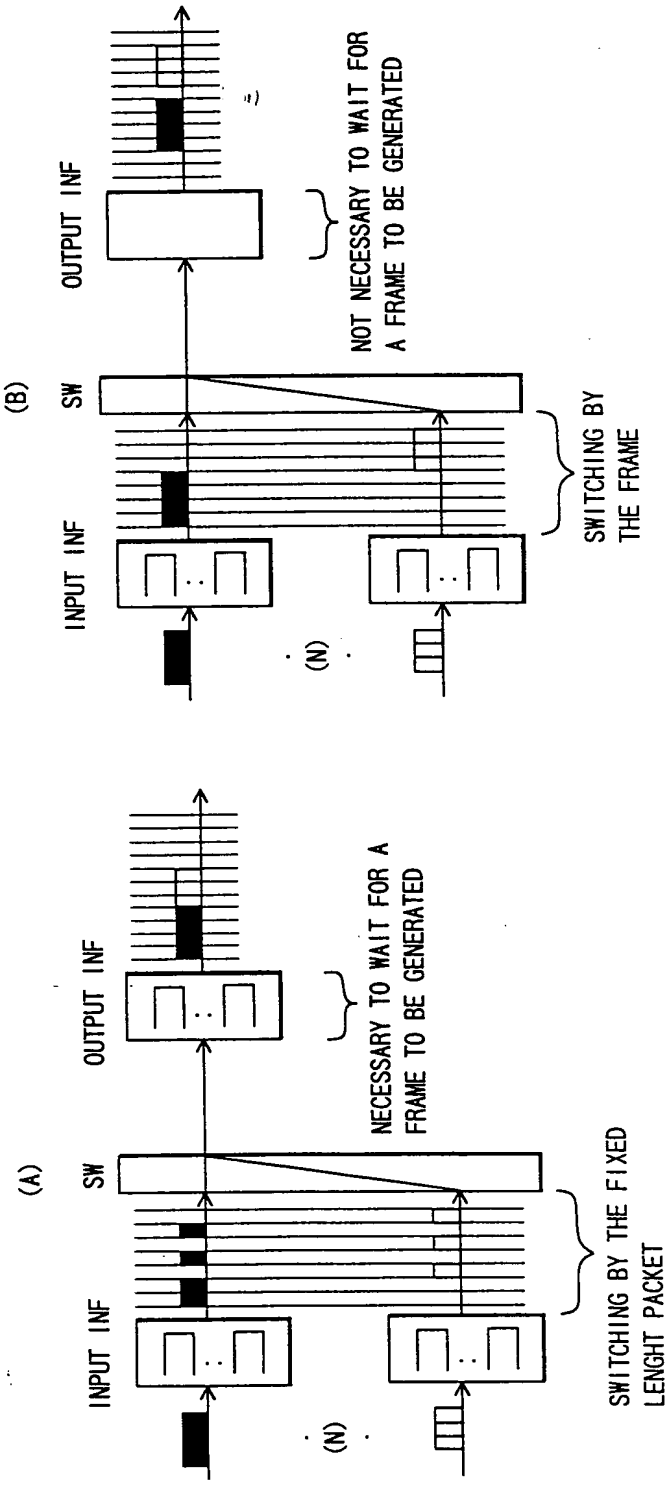


FIG.2

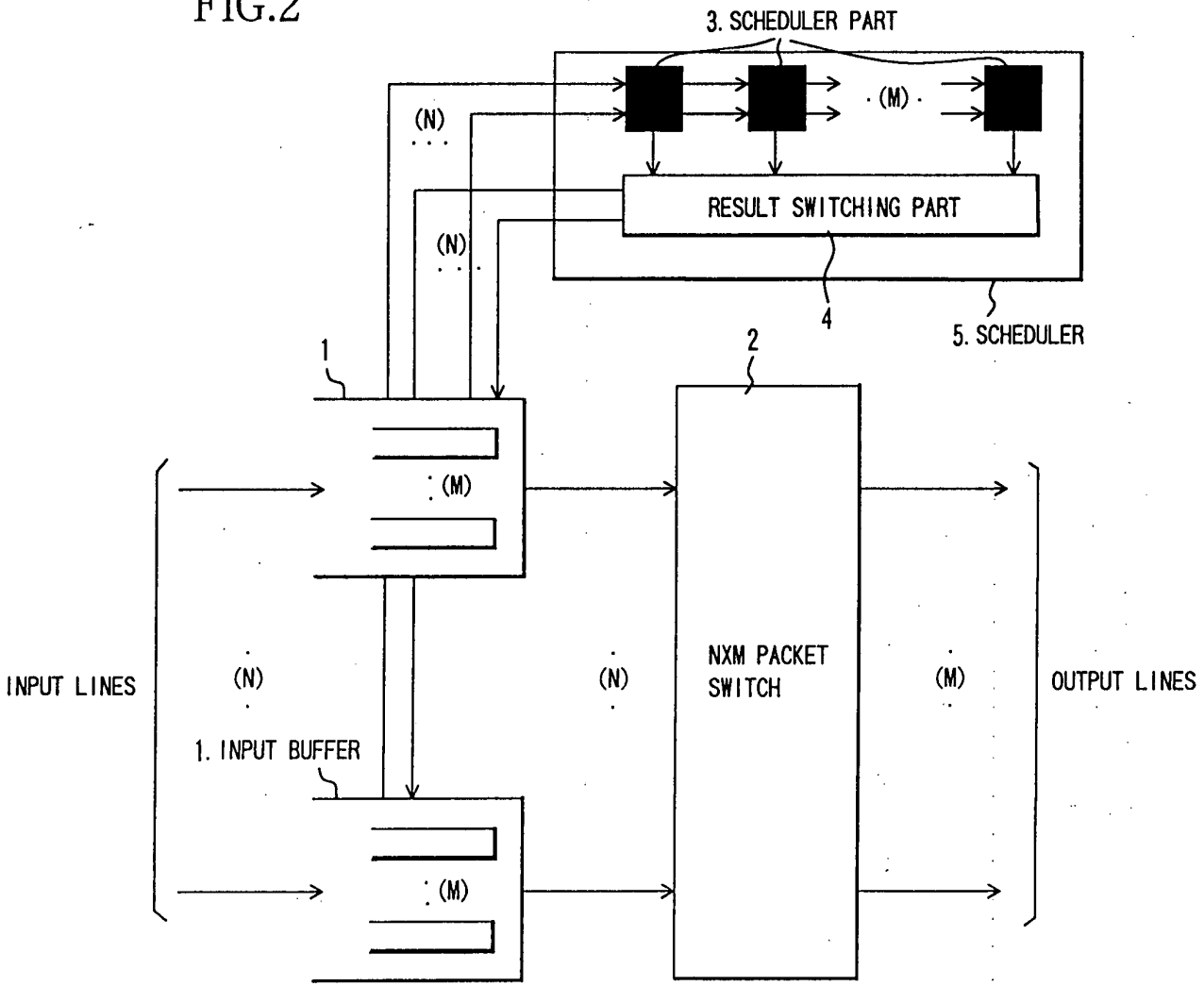

3. SCHEDULER PART
(N)
(M)
RESULT SWITCHING PART
(N)
4
5. SCHEDULER
1
2
(M)
INPUT LINES
(N)
(N)
NXM PACKET SWITCH
(M)
OUTPUT LINES
1. INPUT BUFFER
(M)

FIG.3

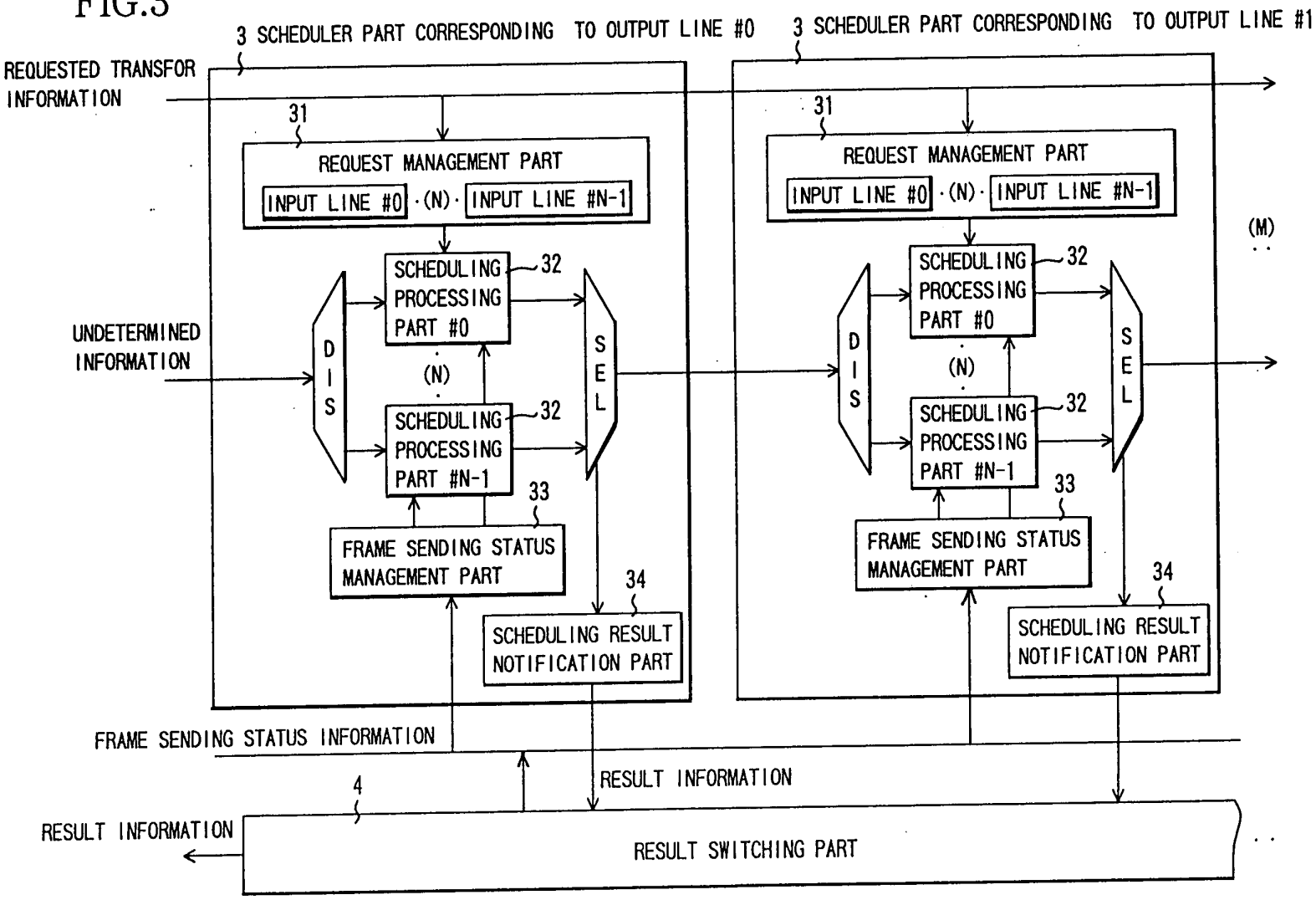

3 SCHEDULER PART CORRESPONDING TO OUTPUT LINE #0
3 SCHEDULER PART CORRESPONDING TO OUTPUT LINE #1
REQUESTED TRANSFOR INFORMATION
31
REQUEST MANAGEMENT PART
INPUT LINE #0
·(N)·
INPUT LINE #N-1
(M)
UNDETERMINED INFORMATION
DIS
SCHEDULING PROCESSING PART #0
32
(N)
SCHEDULING PROCESSING PART #N-1
SEL
33
FRAME SENDING STATUS MANAGEMENT PART
34
SCHEDULING RESULT NOTIFICATION PART
FRAME SENDING STATUS INFORMATION
RESULT INFORMATION
4
RESULT INFORMATION
RESULT SWITCHING PART

FIG.4

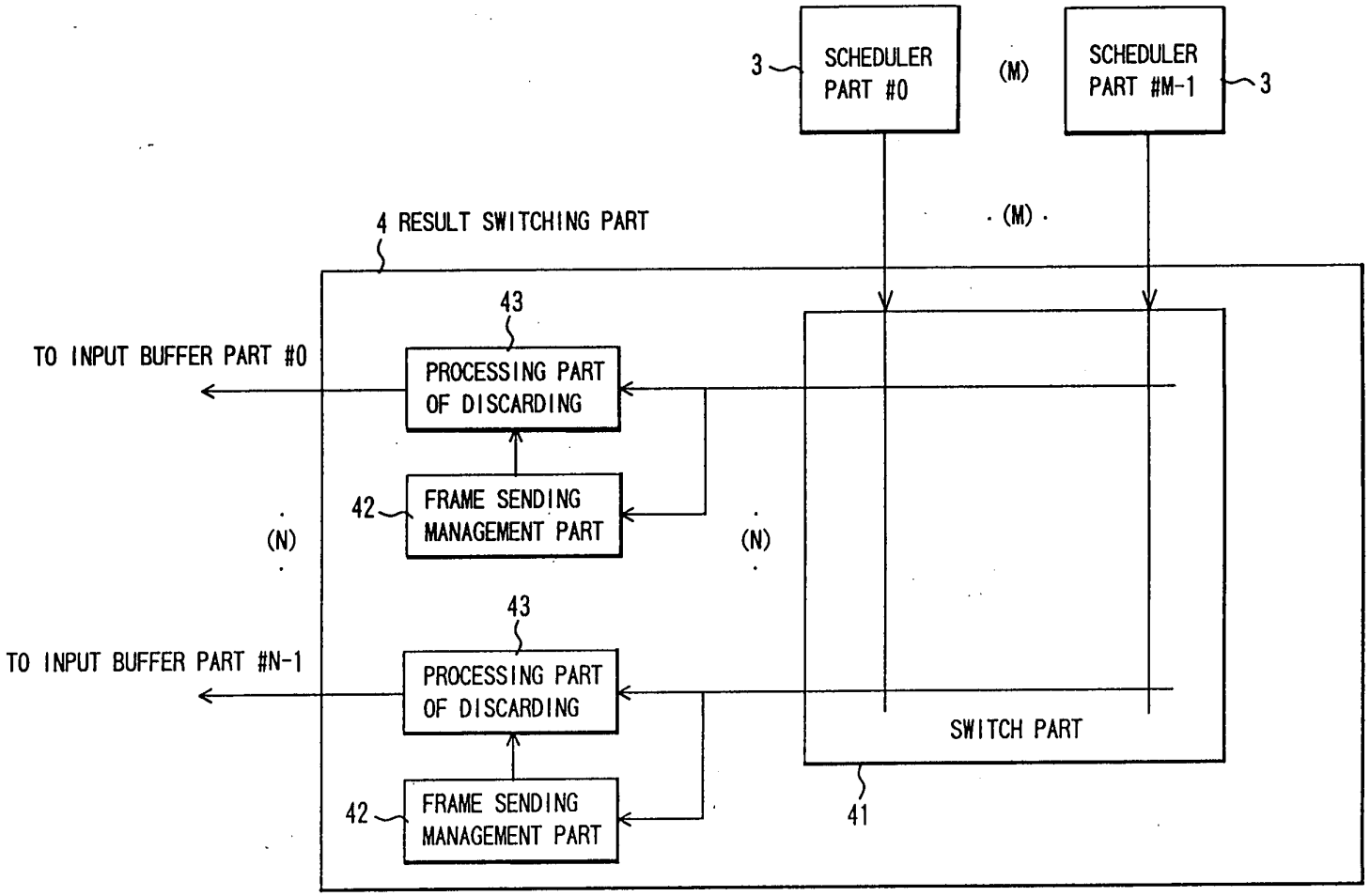

3
SCHEDULER PART #0
(M)
SCHEDULER PART #M-1
3
4 RESULT SWITCHING PART
(M)
43
TO INPUT BUFFER PART #0
PROCESSING PART OF DISCARDING
42
FRAME SENDING MANAGEMENT PART
(N)
(N)
43
TO INPUT BUFFER PART #N-1
PROCESSING PART OF DISCARDING
42
FRAME SENDING MANAGEMENT PART
SWITCH PART
41

FIG.5

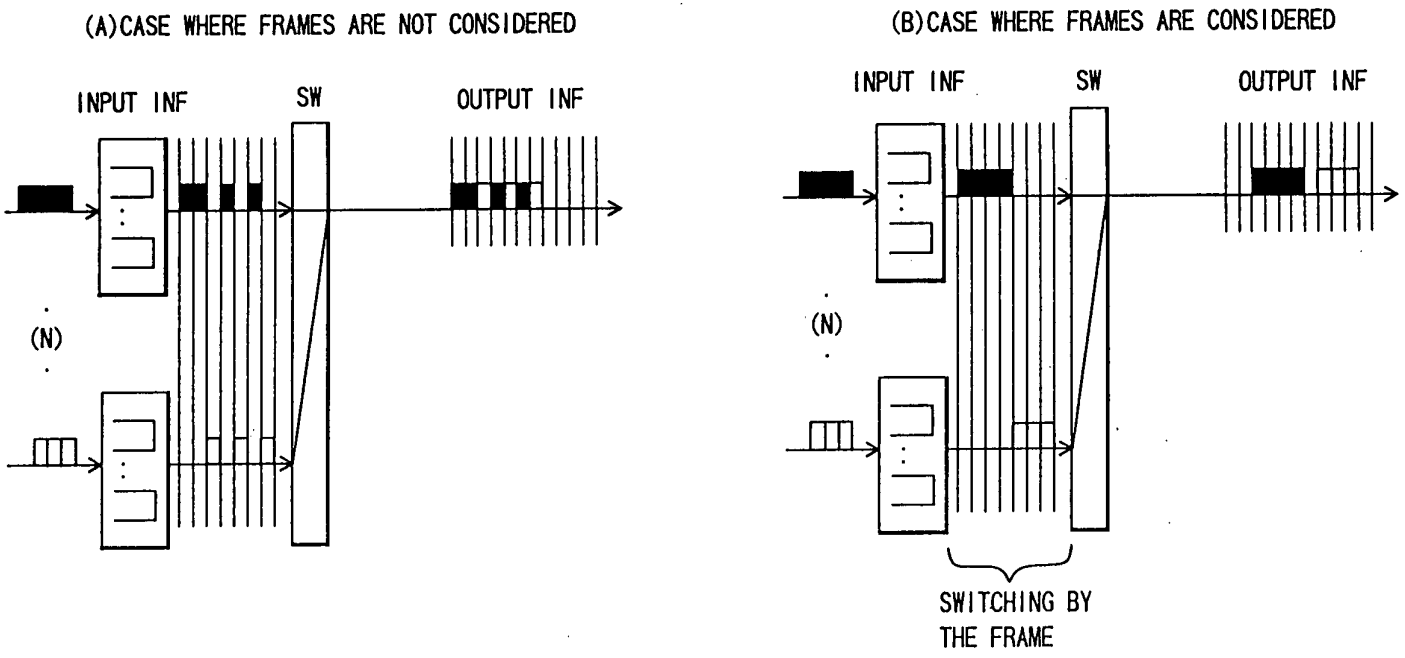

(A)CASE WHERE FRAMES ARE NOT CONSIDERED
INPUT INF
SW
OUTPUT INF
(N)
(B)CASE WHERE FRAMES ARE CONSIDERED
INPUT INF
SW
OUTPUT INF
(N)
SWITCHING BY
THE FRAME

FIG.6

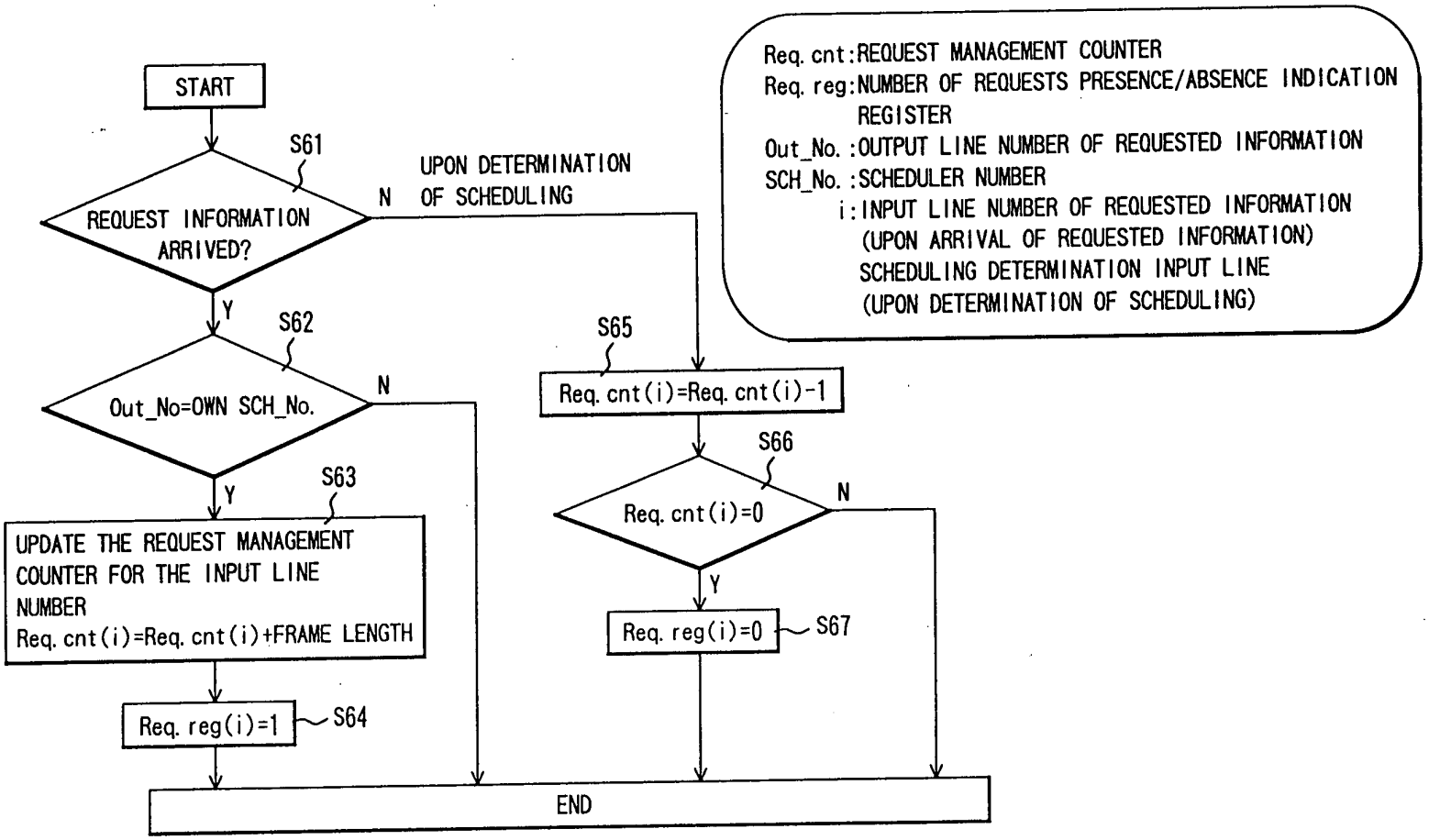

Req. cnt:REQUEST MANAGEMENT COUNTER
Req. reg:NUMBER OF REQUESTS PRESENCE/ABSENCE INDICATION REGISTER
Out_No. :OUTPUT LINE NUMBER OF REQUESTED INFORMATION
SCH_No. :SCHEDULER NUMBER
i:INPUT LINE NUMBER OF REQUESTED INFORMATION (UPON ARRIVAL OF REQUESTED INFORMATION) SCHEDULING DETERMINATION INPUT LINE (UPON DETERMINATION OF SCHEDULING)
START
S61
REQUEST INFORMATION ARRIVED?
N
UPON DETERMINATION OF SCHEDULING
Y
S62
Out_No=OWN SCH_No.
N
Y
S63
UPDATE THE REQUEST MANAGEMENT COUNTER FOR THE INPUT LINE NUMBER
Req. cnt(i)=Req. cnt(i)+FRAME LENGTH
Req. reg(i)=1
S64
S65
Req. cnt(i)=Req. cnt(i)-1
S66
Req. cnt(i)=0
N
Y
Req. reg(i)=0
S67
END

FIG.7

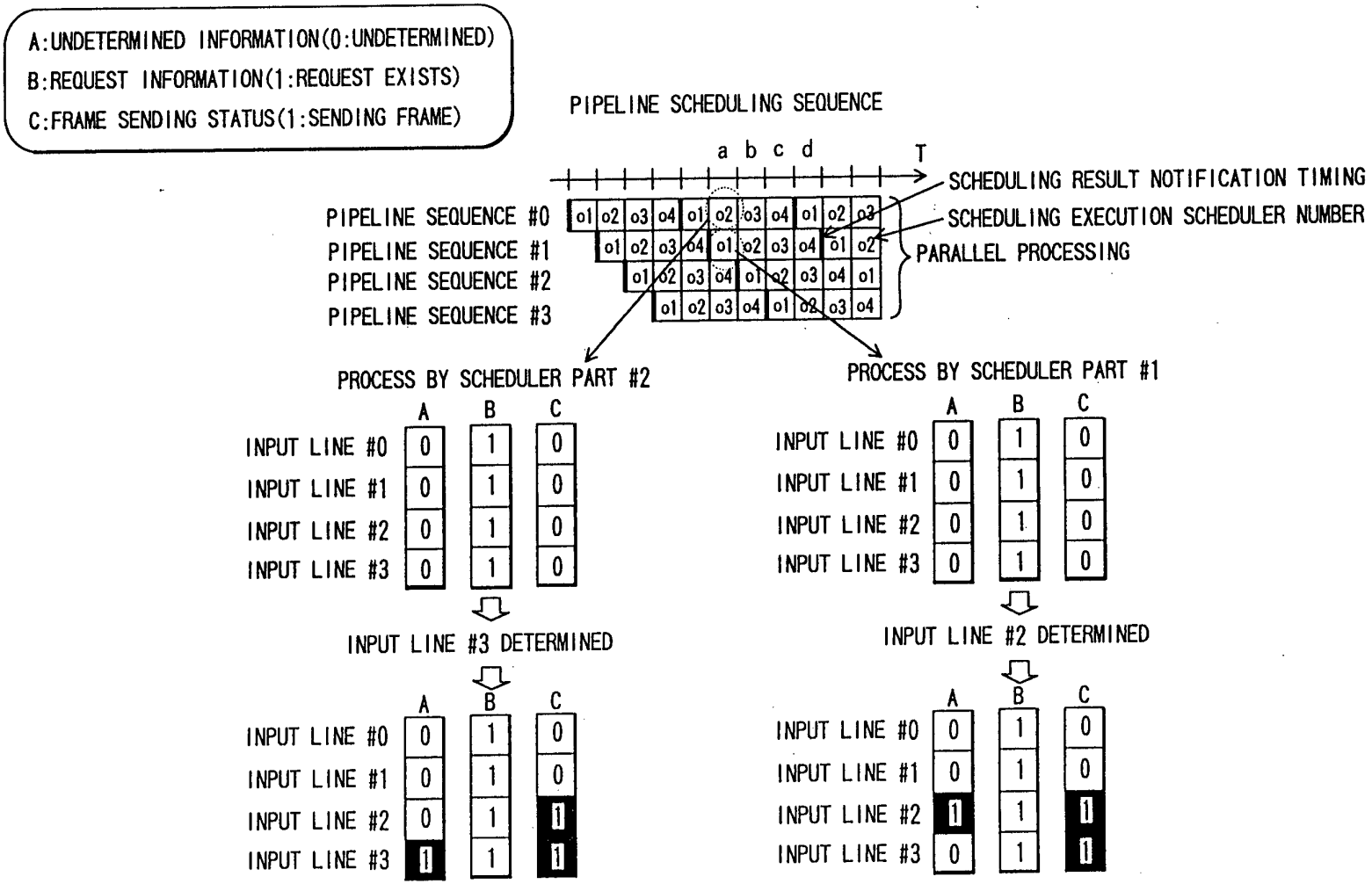

A:UNDETERMINED INFORMATION(0:UNDETERMINED)
B:REQUEST INFORMATION(1:REQUEST EXISTS)
C:FRAME SENDING STATUS(1:SENDING FRAME)
PIPELINE SCHEDULING SEQUENCE
a b c d
T
SCHEDULING RESULT NOTIFICATION TIMING
SCHEDULING EXECUTION SCHEDULER NUMBER
PARALLEL PROCESSING
PIPELINE SEQUENCE #0
PIPELINE SEQUENCE #1
PIPELINE SEQUENCE #2
PIPELINE SEQUENCE #3
PROCESS BY SCHEDULER PART #2
PROCESS BY SCHEDULER PART #1
A B C
INPUT LINE #0
INPUT LINE #1
INPUT LINE #2
INPUT LINE #3
INPUT LINE #3 DETERMINED
INPUT LINE #2 DETERMINED

FIG.8

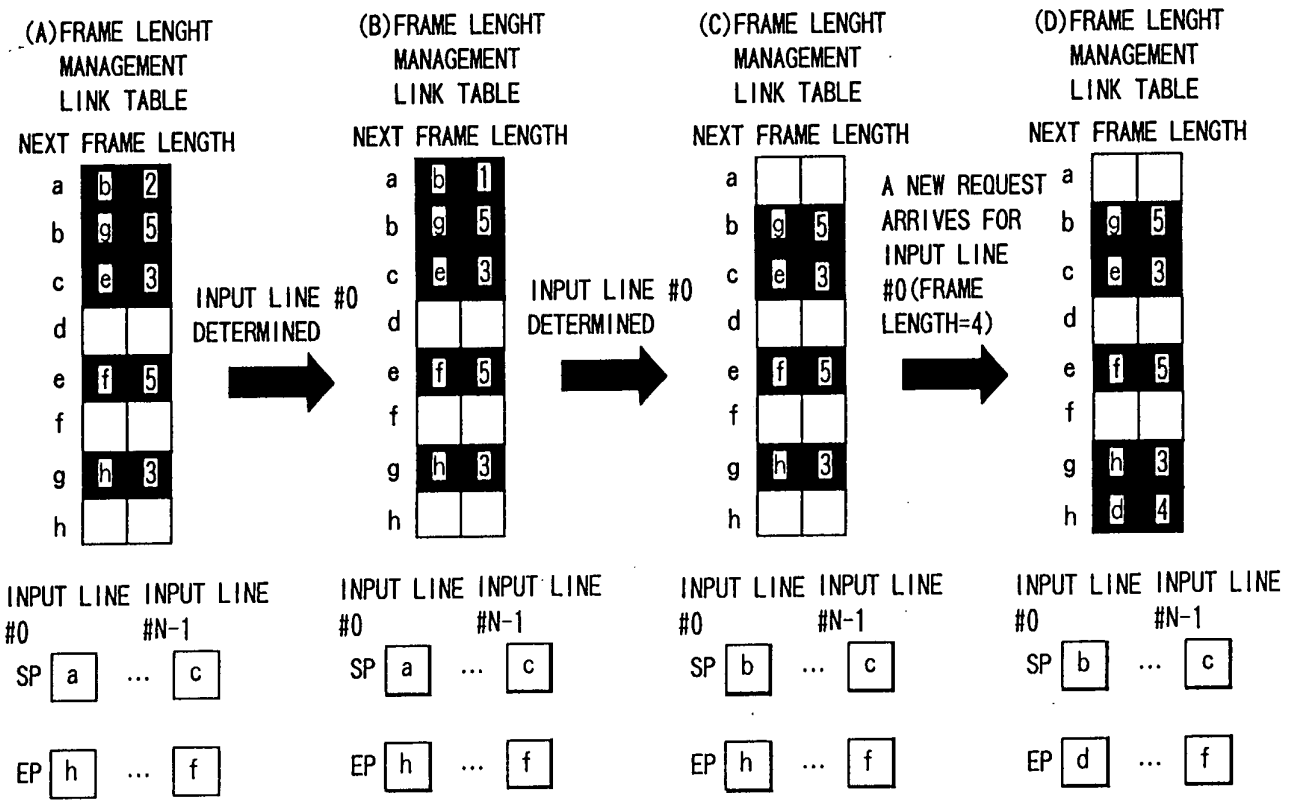

(A)FRAME LENGHT MANAGEMENT LINK TABLE
NEXT FRAME LENGTH
a b 2
b g 5
c e 3
d
e f 5
f
g h 3
h
INPUT LINE #0 DETERMINED
(B)FRAME LENGHT MANAGEMENT LINK TABLE
NEXT FRAME LENGTH
a b 1
b g 5
c e 3
d
e f 5
f
g h 3
h
INPUT LINE #0 DETERMINED
(C)FRAME LENGHT MANAGEMENT LINK TABLE
NEXT FRAME LENGTH
a
b g 5
c e 3
d
e f 5
f
g h 3
h
A NEW REQUEST ARRIVES FOR INPUT LINE #0(FRAME LENGTH=4)
(D)FRAME LENGHT MANAGEMENT LINK TABLE
NEXT FRAME LENGTH
a
b g 5
c e 3
d
e f 5
f
g h 3
h d 4
INPUT LINE #0
INPUT LINE #N-1
SP a ... c
EP h ... f
INPUT LINE #0
INPUT LINE #N-1
SP a ... c
EP h ... f
INPUT LINE #0
INPUT LINE #N-1
SP b ... c
EP h ... f
INPUT LINE #0
INPUT LINE #N-1
SP b ... c
EP d ... f

FIG.9

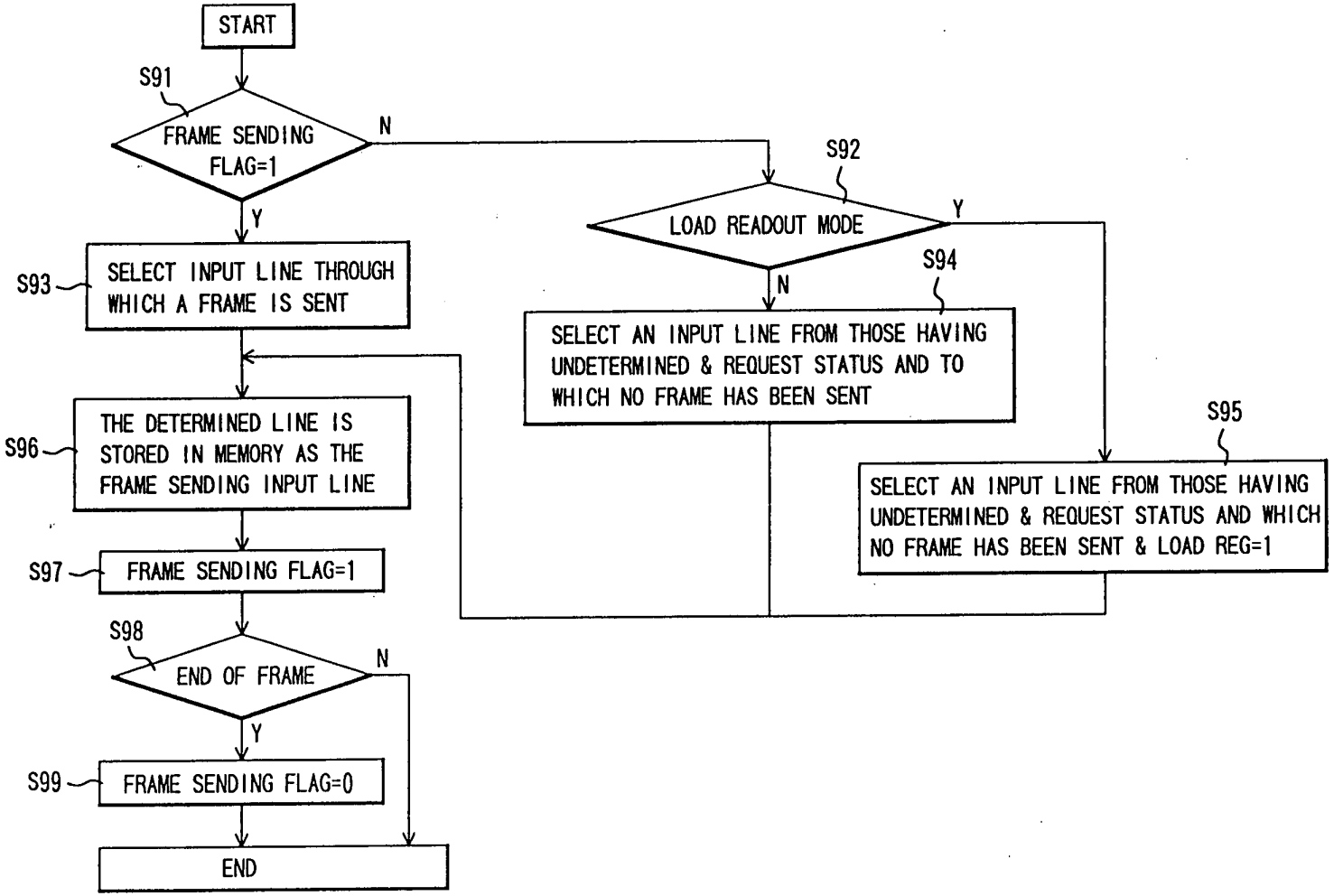

START
S91
FRAME SENDING FLAG=1
N
Y
S92
LOAD READOUT MODE
Y
N
S93
SELECT INPUT LINE THROUGH WHICH A FRAME IS SENT
S94
SELECT AN INPUT LINE FROM THOSE HAVING UNDETERMINED & REQUEST STATUS AND TO WHICH NO FRAME HAS BEEN SENT
S95
SELECT AN INPUT LINE FROM THOSE HAVING UNDETERMINED & REQUEST STATUS AND WHICH NO FRAME HAS BEEN SENT & LOAD REG=1
S96
THE DETERMINED LINE IS STORED IN MEMORY AS THE FRAME SENDING INPUT LINE
S97
FRAME SENDING FLAG=1
S98
END OF FRAME
N
Y
S99
FRAME SENDING FLAG=0
END

FIG.10

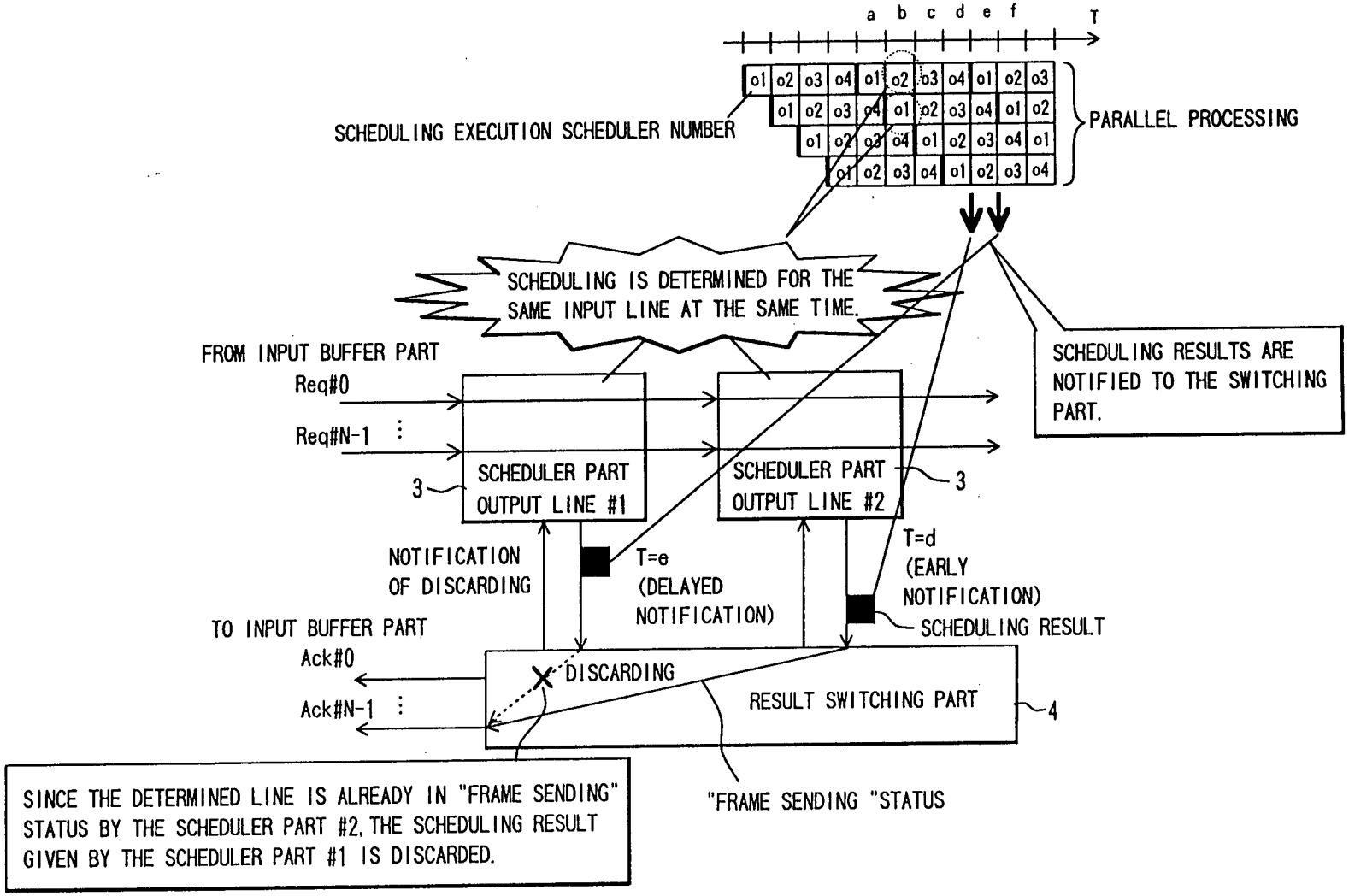

a b c d e f T
SCHEDULING EXECUTION SCHEDULER NUMBER
PARALLEL PROCESSING
SCHEDULING IS DETERMINED FOR THE SAME INPUT LINE AT THE SAME TIME.
SCHEDULING RESULTS ARE NOTIFIED TO THE SWITCHING PART.
FROM INPUT BUFFER PART
Req#0
Req#N-1
SCHEDULER PART OUTPUT LINE #1
SCHEDULER PART OUTPUT LINE #2
3
NOTIFICATION OF DISCARDING
T=e (DELAYED NOTIFICATION)
T=d (EARLY NOTIFICATION)
SCHEDULING RESULT
TO INPUT BUFFER PART
Ack#0
Ack#N-1
DISCARDING
RESULT SWITCHING PART
4
"FRAME SENDING "STATUS
SINCE THE DETERMINED LINE IS ALREADY IN "FRAME SENDING" STATUS BY THE SCHEDULER PART #2, THE SCHEDULING RESULT GIVEN BY THE SCHEDULER PART #1 IS DISCARDED.

FIG.11

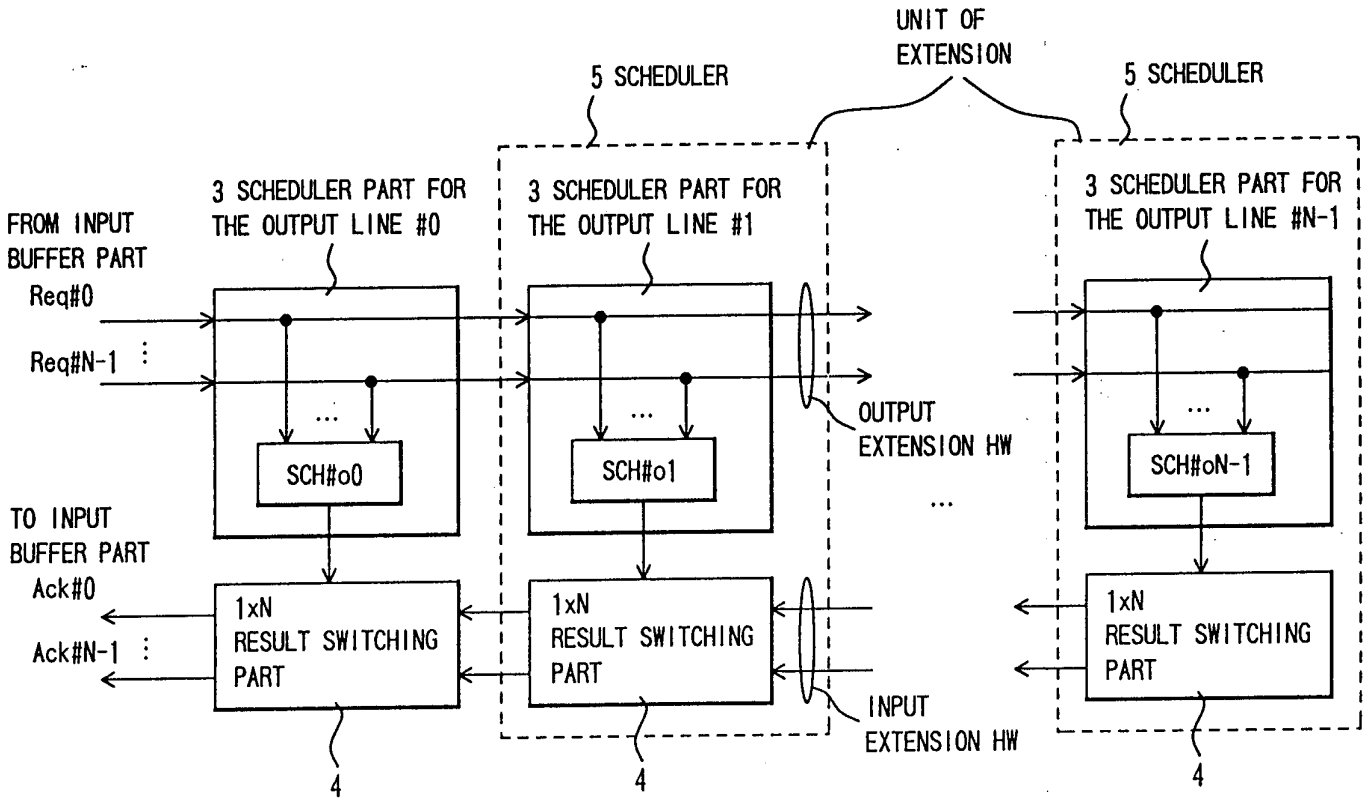

UNIT OF EXTENSION
5 SCHEDULER
5 SCHEDULER
3 SCHEDULER PART FOR THE OUTPUT LINE #0
3 SCHEDULER PART FOR THE OUTPUT LINE #1
3 SCHEDULER PART FOR THE OUTPUT LINE #N-1
FROM INPUT BUFFER PART
Req#0
Req#N-1
SCH#o0
SCH#o1
SCH#oN-1
OUTPUT EXTENSION HW
TO INPUT BUFFER PART
Ack#0
Ack#N-1
1xN RESULT SWITCHING PART
1xN RESULT SWITCHING PART
1xN RESULT SWITCHING PART
INPUT EXTENSION HW
4
4
4

FIG.12

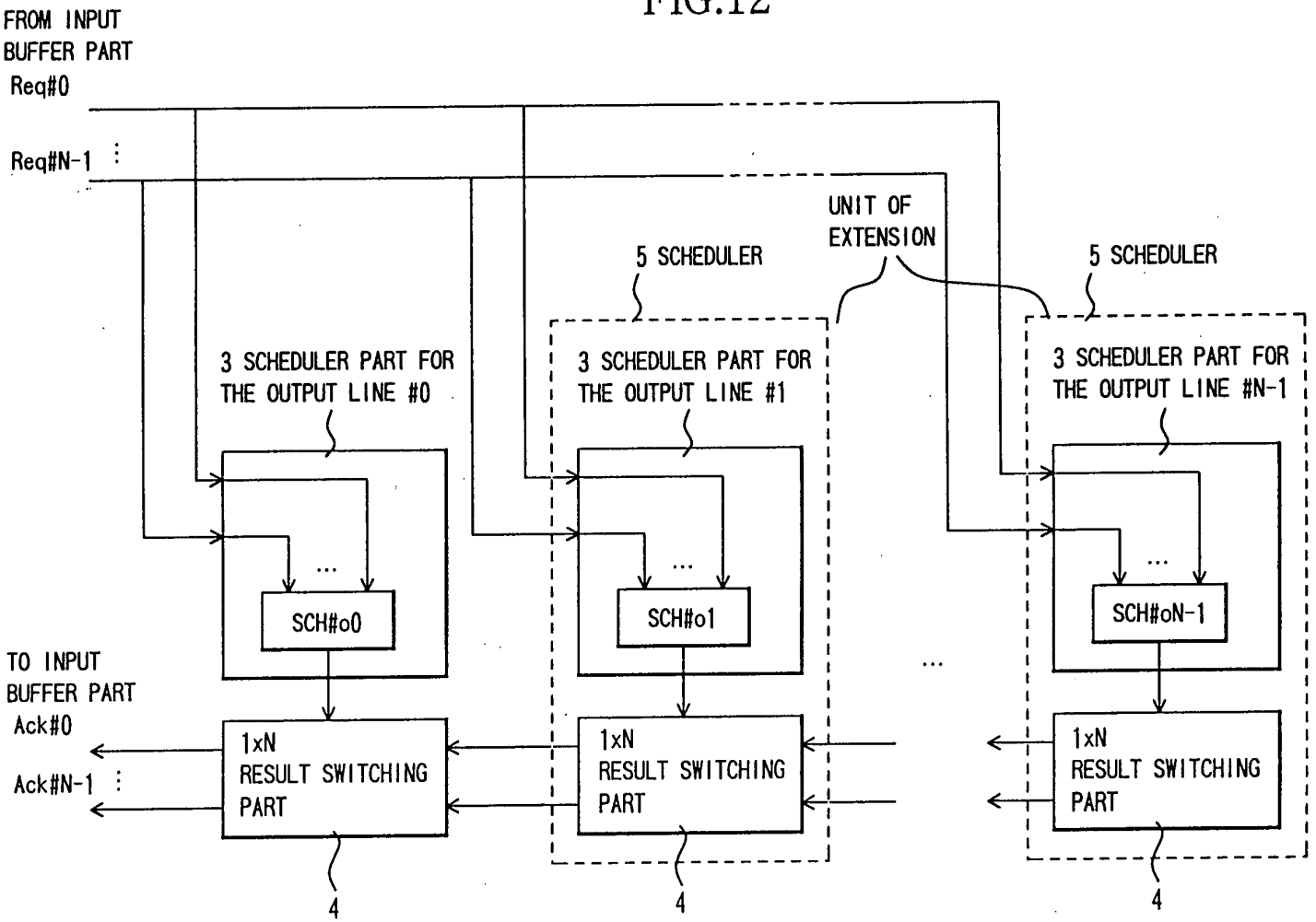

FROM INPUT BUFFER PART
Req#0
Req#N-1
UNIT OF EXTENSION
5 SCHEDULER
5 SCHEDULER
3 SCHEDULER PART FOR THE OUTPUT LINE #0
3 SCHEDULER PART FOR THE OUTPUT LINE #1
3 SCHEDULER PART FOR THE OUTPUT LINE #N-1
SCH#o0
SCH#o1
SCH#oN-1
TO INPUT BUFFER PART
Ack#0
Ack#N-1
1xN RESULT SWITCHING PART
1xN RESULT SWITCHING PART
1xN RESULT SWITCHING PART
4
4
4

FIG.13

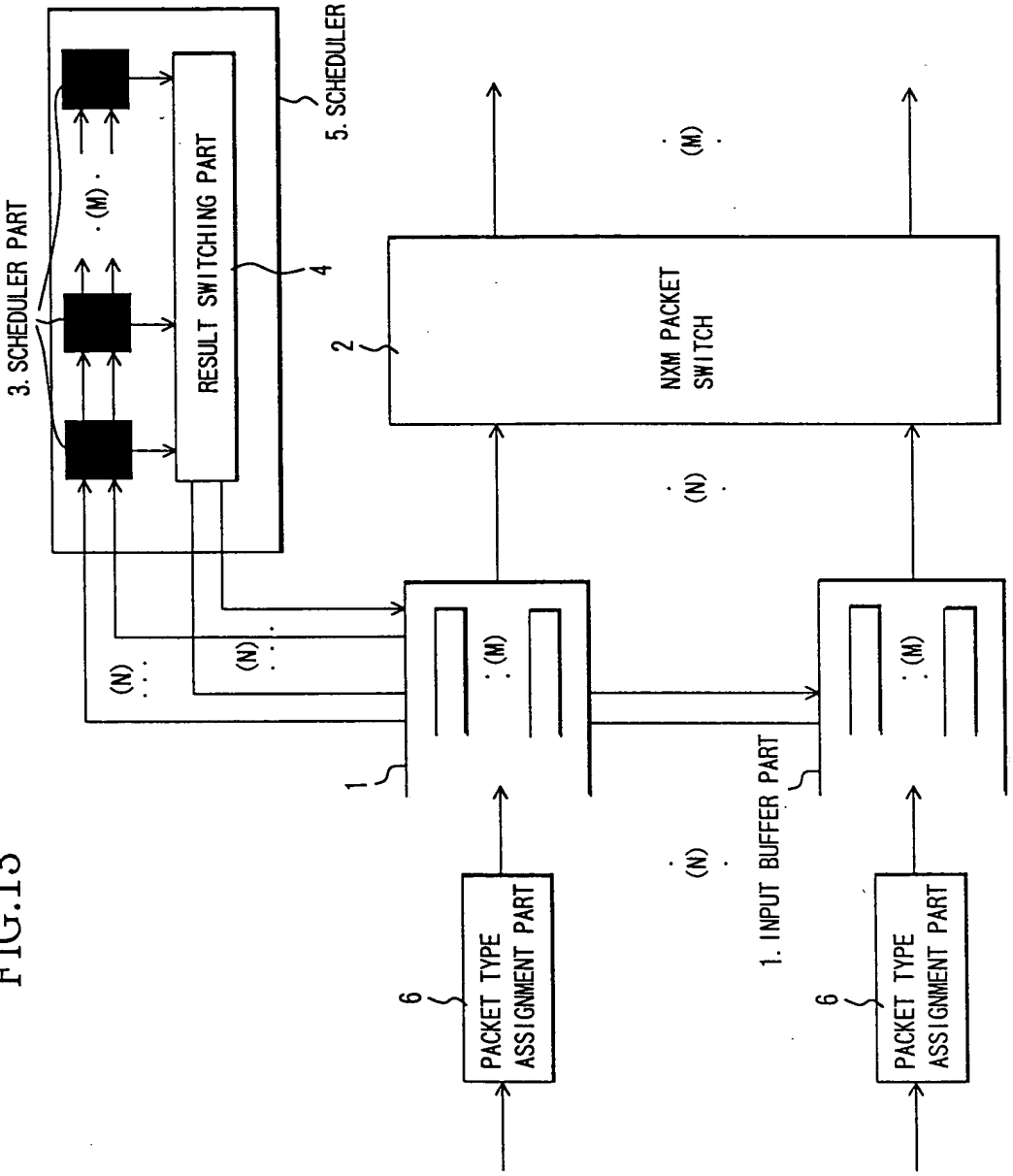


FIG.14

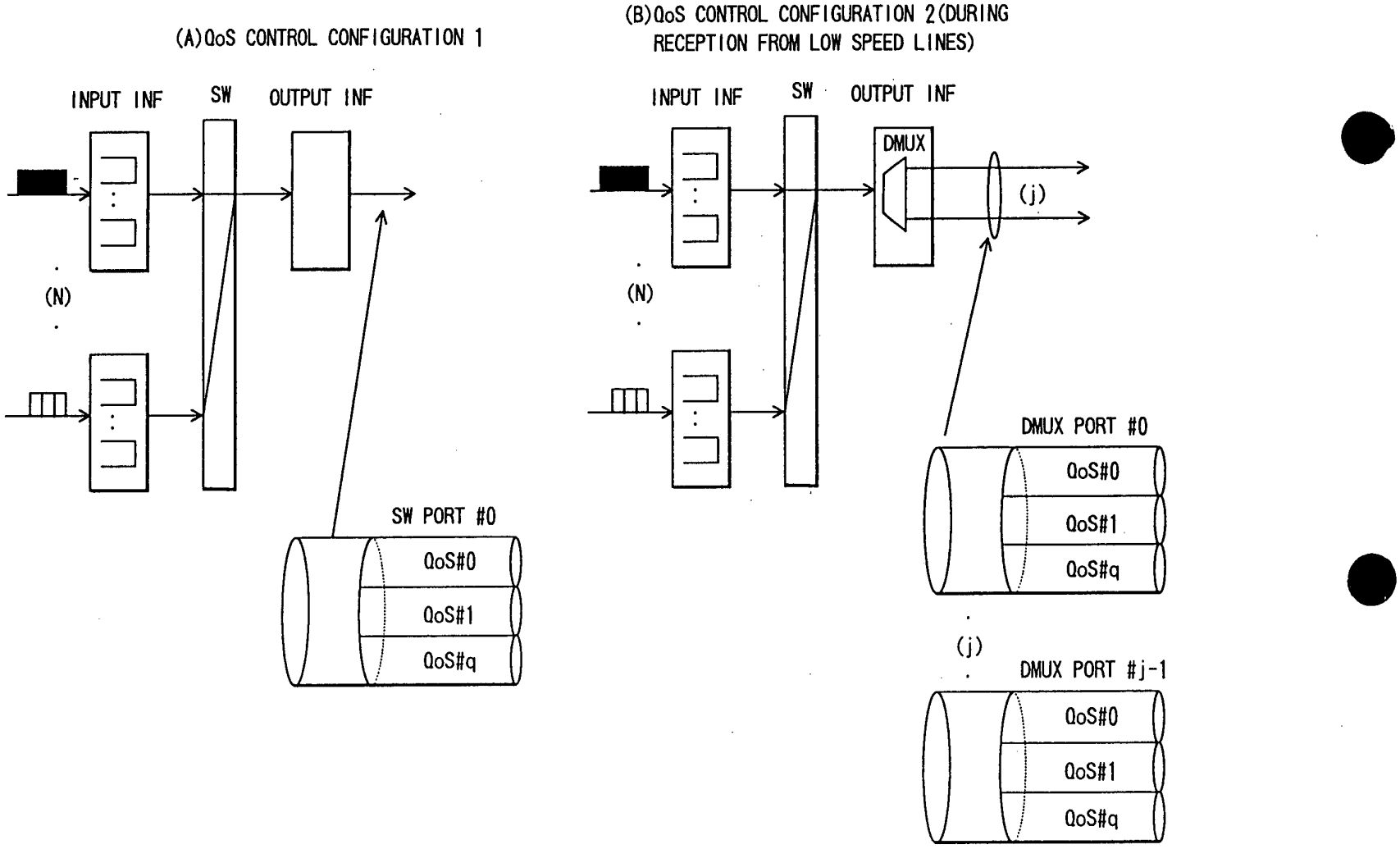

(A)QoS CONTROL CONFIGURATION 1
INPUT INF
SW
OUTPUT INF
(N)
SW PORT #0
QoS#0
QoS#1
QoS#q
(B)QoS CONTROL CONFIGURATION 2(DURING RECEPTION FROM LOW SPEED LINES)
INPUT INF
SW
OUTPUT INF
DMUX
(j)
(N)
DMUX PORT #0
QoS#0
QoS#1
QoS#q
(j)
DMUX PORT #j-1
QoS#0
QoS#1
QoS#q

FIG.15

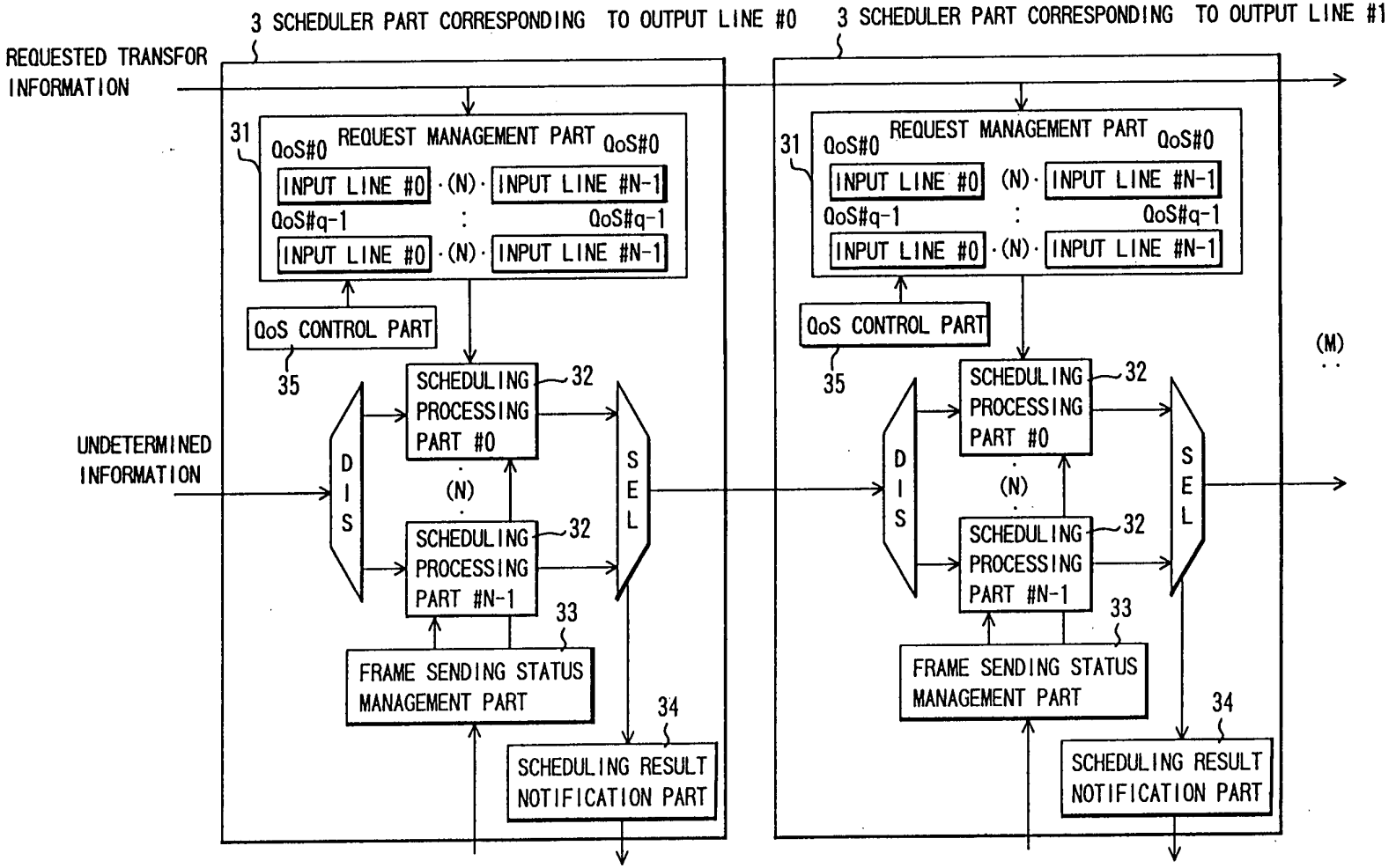

3 SCHEDULER PART CORRESPONDING TO OUTPUT LINE #0
3 SCHEDULER PART CORRESPONDING TO OUTPUT LINE #1
REQUESTED TRANSFOR INFORMATION
UNDETERMINED INFORMATION
31
REQUEST MANAGEMENT PART
QoS#0
INPUT LINE #0
(N)
INPUT LINE #N-1
QoS#q-1
QoS CONTROL PART
35
SCHEDULING PROCESSING PART #0
SCHEDULING PROCESSING PART #N-1
32
DIS
SEL
(M)
33
FRAME SENDING STATUS MANAGEMENT PART
34
SCHEDULING RESULT NOTIFICATION PART

FIG.16

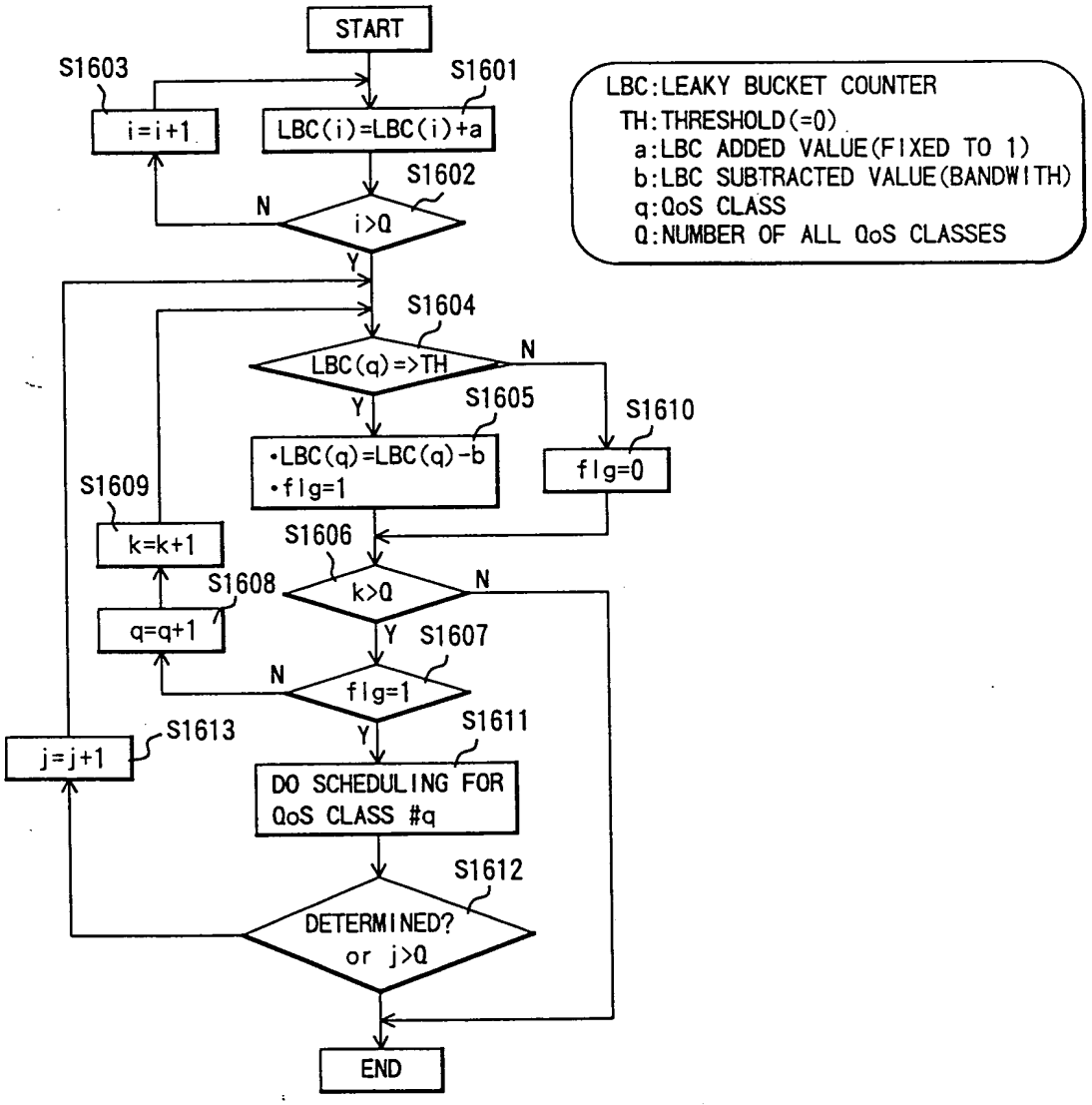

START
S1601
LBC(i)=LBC(i)+a
S1602
i>Q
N
Y
S1603
i=i+1
S1604
LBC(q)=>TH
N
Y
S1605
•LBC(q)=LBC(q)-b
•flg=1
S1610
flg=0
S1606
k>Q
N
Y
S1607
flg=1
N
Y
S1608
q=q+1
S1609
k=k+1
S1611
DO SCHEDULING FOR QoS CLASS #q
S1612
DETERMINED? or j>Q
S1613
j=j+1
END
LBC:LEAKY BUCKET COUNTER
TH:THRESHOLD(=0)
a:LBC ADDED VALUE(FIXED TO 1)
b:LBC SUBTRACTED VALUE(BANDWITH)
q:QoS CLASS
Q:NUMBER OF ALL QoS CLASSES

FIG.17

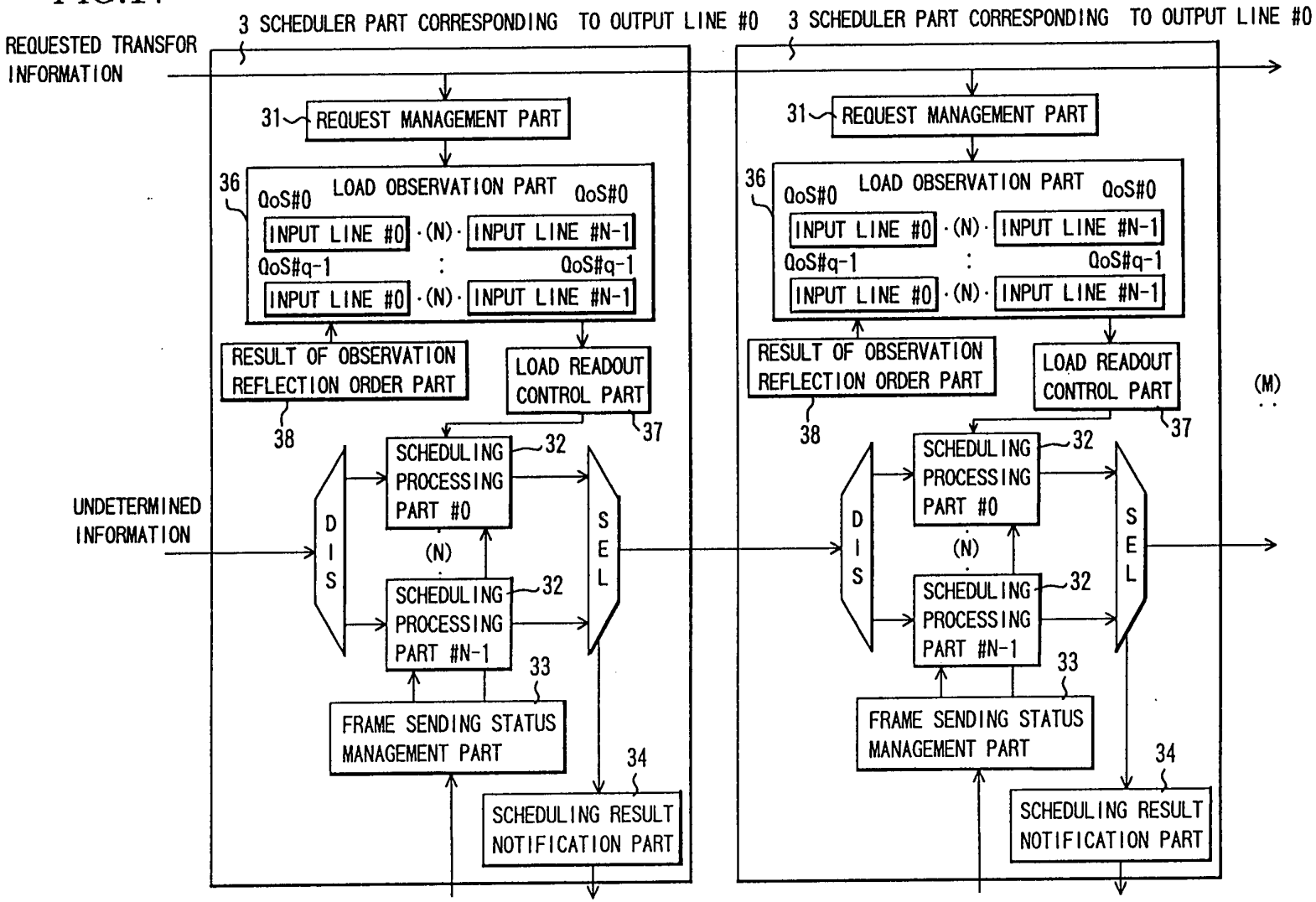

3 SCHEDULER PART CORRESPONDING TO OUTPUT LINE #0
3 SCHEDULER PART CORRESPONDING TO OUTPUT LINE #0
REQUESTED TRANSFOR INFORMATION
31
REQUEST MANAGEMENT PART
36
QoS#0
LOAD OBSERVATION PART
QoS#0
INPUT LINE #0
·(N)·
INPUT LINE #N-1
QoS#q-1
:
QoS#q-1
INPUT LINE #0
·(N)·
INPUT LINE #N-1
RESULT OF OBSERVATION REFLECTION ORDER PART
38
LOAD READOUT CONTROL PART
37
(M)
UNDETERMINED INFORMATION
DIS
SCHEDULING PROCESSING PART #0
32
(N)
SCHEDULING PROCESSING PART #N-1
32
SEL
33
FRAME SENDING STATUS MANAGEMENT PART
34
SCHEDULING RESULT NOTIFICATION PART

FIG.18

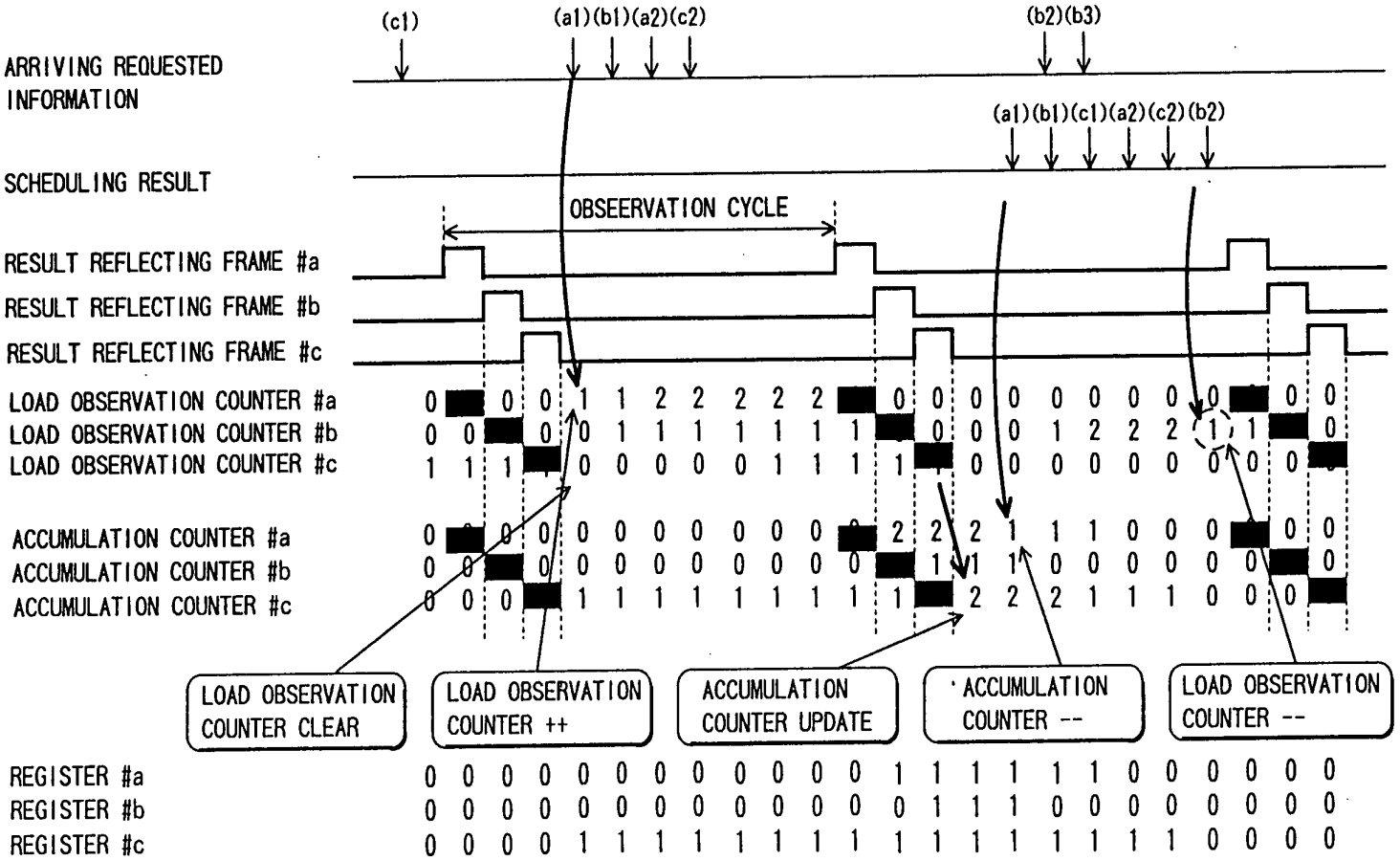
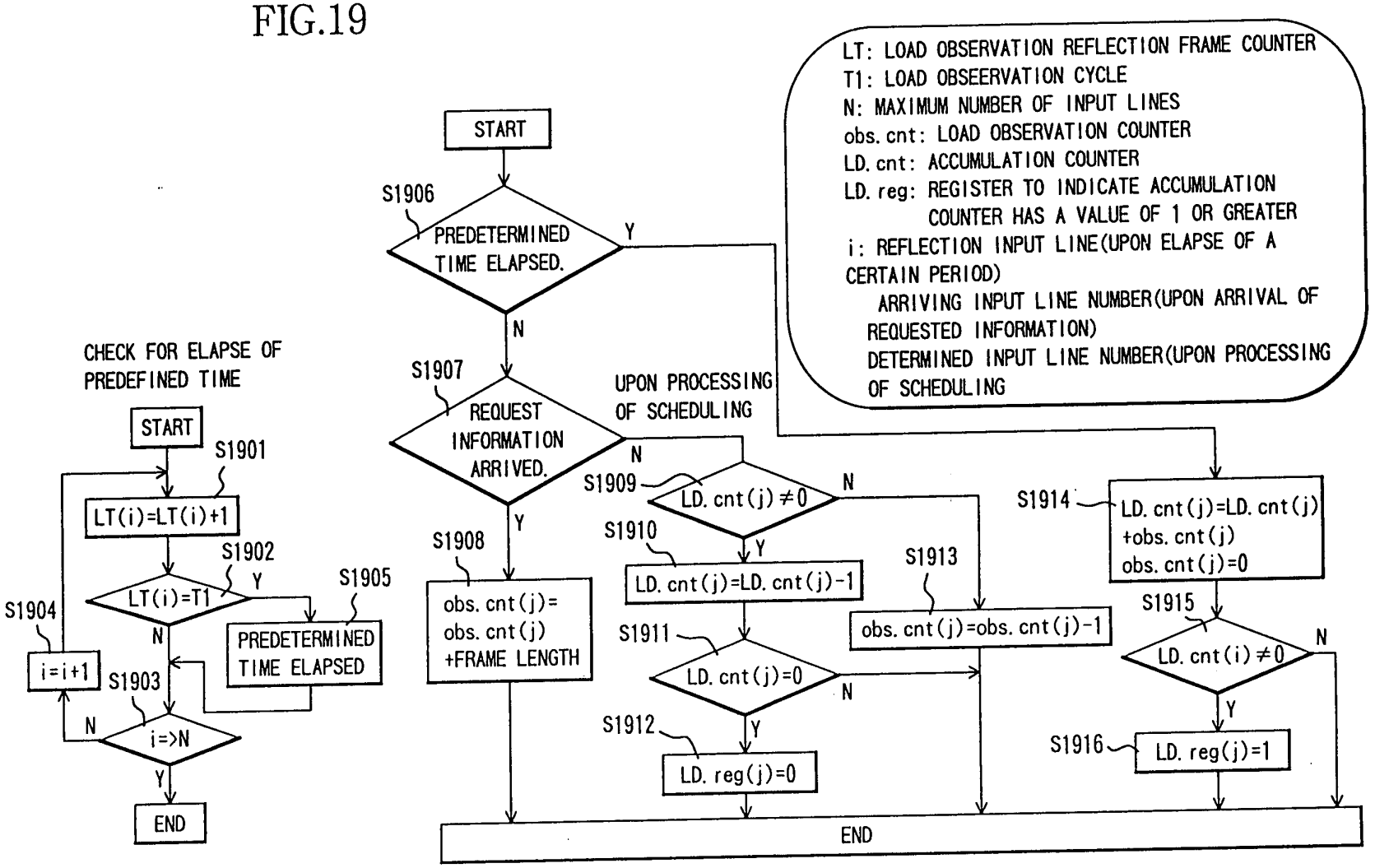

(c1)
(a1)(b1)(a2)(c2)
(b2)(b3)
ARRIVING REQUESTED INFORMATION
(a1)(b1)(c1)(a2)(c2)(b2)
SCHEDULING RESULT
OBSEERVATION CYCLE
RESULT REFLECTING FRAME #a
RESULT REFLECTING FRAME #b
RESULT REFLECTING FRAME #c
LOAD OBSERVATION COUNTER #a
LOAD OBSERVATION COUNTER #b
LOAD OBSERVATION COUNTER #c
ACCUMULATION COUNTER #a
ACCUMULATION COUNTER #b
ACCUMULATION COUNTER #c
LOAD OBSERVATION COUNTER CLEAR
LOAD OBSERVATION COUNTER ++
ACCUMULATION COUNTER UPDATE
ACCUMULATION COUNTER --
LOAD OBSERVATION COUNTER --
REGISTER #a
REGISTER #b
REGISTER #c

FIG.19


LT: LOAD OBSERVATION REFLECTION FRAME COUNTER
T1: LOAD OBSEERVATION CYCLE
N: MAXIMUM NUMBER OF INPUT LINES
obs. cnt: LOAD OBSERVATION COUNTER
LD. cnt: ACCUMULATION COUNTER
LD. reg: REGISTER TO INDICATE ACCUMULATION COUNTER HAS A VALUE OF 1 OR GREATER
i: REFLECTION INPUT LINE(UPON ELAPSE OF A CERTAIN PERIOD)
ARRIVING INPUT LINE NUMBER(UPON ARRIVAL OF REQUESTED INFORMATION)
DETERMINED INPUT LINE NUMBER(UPON PROCESSING OF SCHEDULING
CHECK FOR ELAPSE OF PREDEFINED TIME
START
S1901
LT(i)=LT(i)+1
S1902
LT(i)=T1
Y
S1905
PREDETERMINED TIME ELAPSED
N
S1903
i=>N
N
S1904
i=i+1
Y
END
START
S1906
PREDETERMINED TIME ELAPSED.
Y
N
S1907
REQUEST INFORMATION ARRIVED.
Y
S1908
obs. cnt(j)= obs. cnt(j) +FRAME LENGTH
N
UPON PROCESSING OF SCHEDULING
S1909
LD. cnt(j)≠0
N
Y
S1910
LD. cnt(j)=LD. cnt(j)-1
S1911
LD. cnt(j)=0
N
Y
S1912
LD. reg(j)=0
S1913
obs. cnt(j)=obs. cnt(j)-1
S1914
LD. cnt(j)=LD. cnt(j) +obs. cnt(j)
obs. cnt(j)=0
S1915
LD. cnt(i)≠0
N
Y
S1916
LD. reg(j)=1
END